Coniogramme bashanensis (Pteridaceae), a New Fern Species from Shaanxi, China

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ABSTRACT. A new species, *Coniogramme bashanensis* X. S. Guo & B. Li (Pteridaceae), is described and illustrated. This new fern species was collected from the northern slope of Mt. Bashan in Langao County of Shaanxi Province, China. It is similar to *C. wilsonii* Hieron. in its perennial habit and frond veins that are 1- or 2-forked, occasionally connected to form one or two areoles. These fern taxa differ by the shape of the frond base. Pinnules are asymmetrically cuneate or hastate, or divided with a small auriculate segment in *C. bashanensis*; pinnules are cordate or rounded to cuneate, also unevenly so, in *C. wilsonii*.

Key words: China, *Coniogramme*, IUCN Red List, Mt. Bashan, Pteridaceae, Shaanxi.

The genus *Coniogramme* Fée (Pteridaceae) consists of ca. 50 species, distributed mainly in tropical and subtropical regions of Asia, few of which are distributed in Africa and South America (Wu & Ching, 1991). About 39 species of *Coniogramme* were documented from China in the *Flora Reipublicae Popularis Sinicae* (Shing, 1990), mainly in the Changjiang River area and southern and southwestern China. Recently, in the course of exploration in the Bashan Mountains, several specimens of *Coniogramme* were collected. However, these specimens featured either hastate pinnules or were divided with a small auricular segment at the pinnule base, which distinctly differed from those of other *Coniogramme* species. After careful examination of other morphological characters, we determine this to be a new species of *Coniogramme*, which is described herein.

Coniogramme bashanensis X. S. Guo & B. Li, sp. nov. TYPE: China. Shaanxi: Langao, Yihe town, Shiziwan village, 32°16′27″N, 109°4′13″E, 1250 m, 15 Oct. 2004, *Y.-s. Chen, Z.-h. Wu, B. Li & X.-s. Guo 1965* (holotype, WUK; isotype, WUK). Figures 1–3.

Diagnosis. *Coniogramme bashanensis* X. S. Guo & B. Li is most similar to *C. wilsonii* Hieron., but the former has oblong-lanceolate pinnules with a rounded-cuneate or hastate base or the base divided with a small auricular segment, and sparsely short hairs on both surfaces, while the latter has lanceolate pinnules somewhat cordate or rounded-cuneate and glabrous on both surfaces.

Herbs perennial, 60–90 cm tall; stems basally decumbent; scales dark brown, lanceolate; stipes 40–60 cm, ca. 5 mm diam., gray-brown or stramineous; base with sparse, brown, linear-lanceolate scales; lamina 30–40 × ca. 25 cm, broadly ovate, bipinnate; lateral pinnae in 4 to 5 pairs, opposite, oblique and slightly incurved, basal pair largest, 15–20 × ca. 10 cm, petioles 3–4 cm, pinnate; lateral pinnules in 1 to 3 pairs, 10–15 × 2.5–4 cm, oblong to lanceolate, apex acuminate and caudate, base rounded to cuneate or hastate, shortly stalked or sessile; medial pinnae simple, oblong or lanceolate, 15–18 × 3–4 cm, petiolules 2–20 mm, otherwise similar to lateral pinnules, hastate or divided with a small auricular segment at base, unequal; terminal pinnules larger than adjacent pinnules, petiolules 1.8 cm, oblong to lanceolate, apex acuminate and caudate, base rounded to cuneate, unequal; fronds herbaceous when dry, adaxially dark green, abaxially gray-green, sparsely short pubescent; pinnae and pinnules serrulate with minute, slightly irregular, deltate teeth; veins 1- or 2-forked, occasionally connected to form 1 or 2 areoles; the veinlets end in hydathodes; hydathodes slightly thickened, linear, reaching to base of teeth. Sori continuous along pinnule veins, extending to 6 mm from the pinna margin.

Distribution and habitat. *Coniogramme bashanensis* is known only from Langao County in Shaanxi Province, China. Langao County is located in the middle of the northern slope of Mt. Bashan. The new species occurs in secondary forest, as well as along trails in the forest. The primary vegetation of the type locality is deciduous broad-leaved forest or mixed temperate coniferous and broad-leaved forest, and the dominant species are *Quercus aliena* Blume var. *acutiserrata* Maxim. ex Wenz., *Pinus tabuliformis* Carrière, and *Robinia pseudoacacia* L.

IUCN Red List category. *Coniogramme bashanensis* is known only from one population with mature individuals fewer than 150. Its distributional area is smaller than 100 km^2. The only known population of *C. bashanensis* is severely threatened by developing tourism and overgrazing in the area. Its conservation

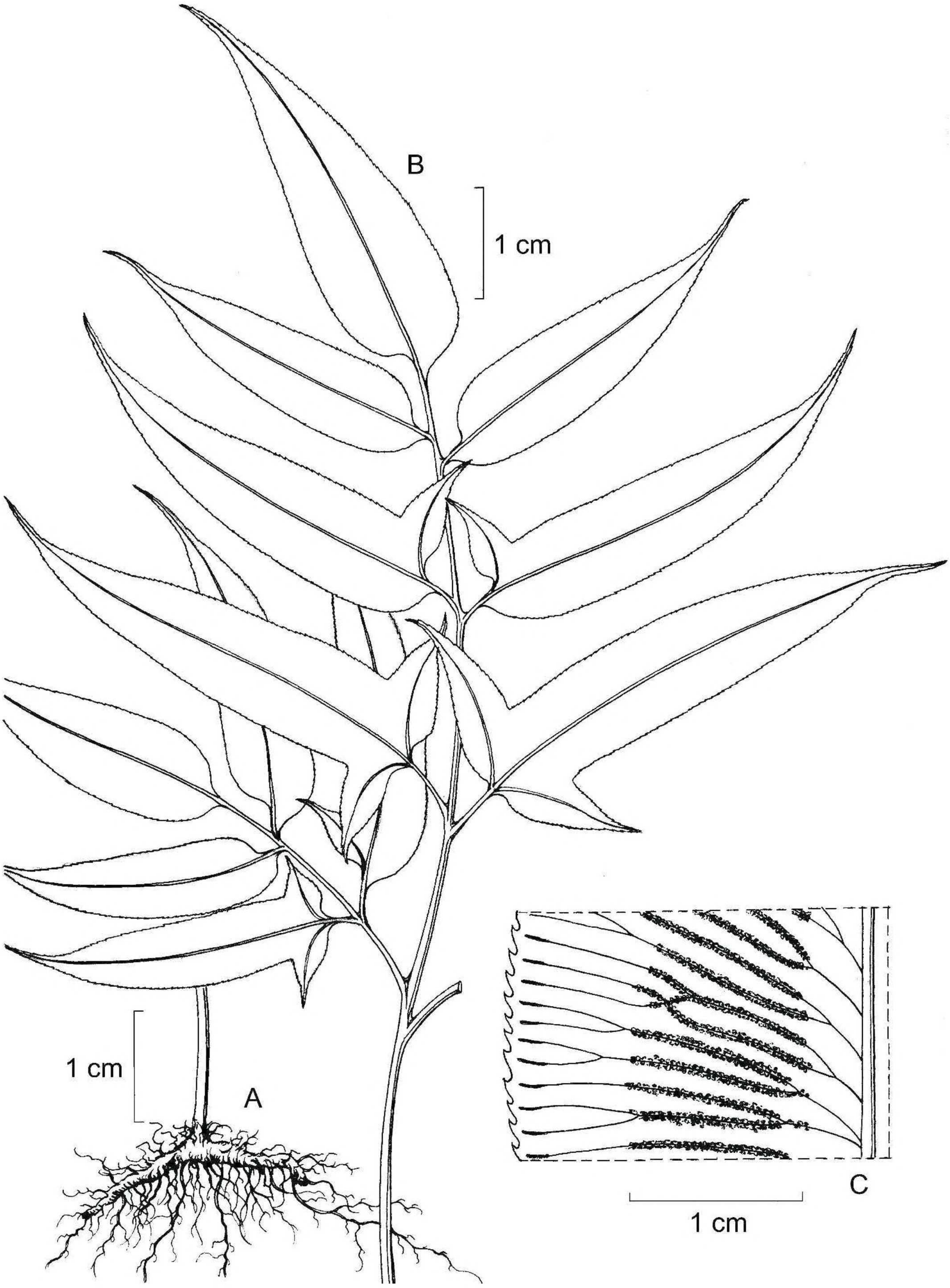
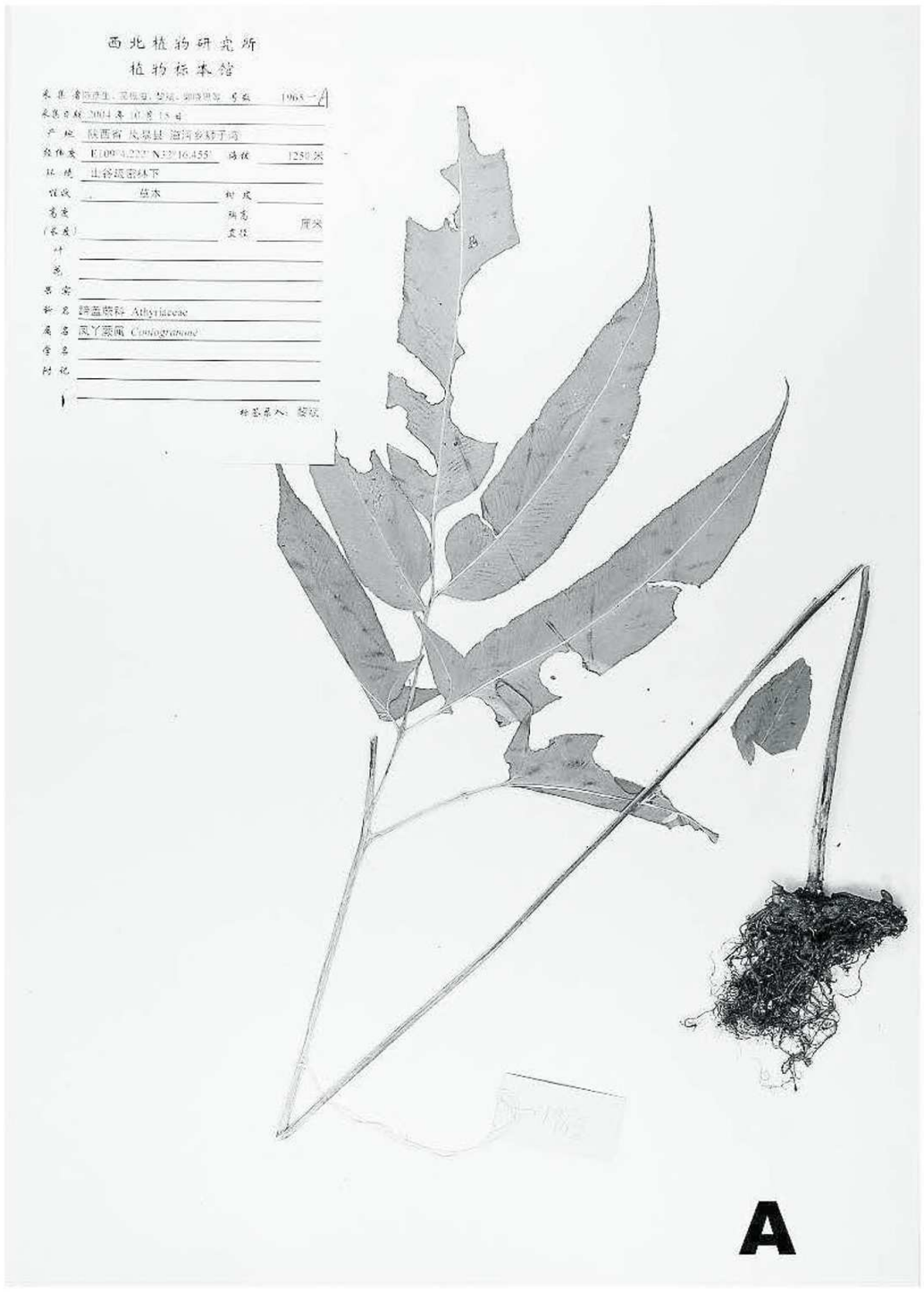


Figure 1. *Coniogramme bashanensis* X. S. Guo & B. Li. —A. Rhizome. —B. Frond. —C. Portion of leaf showing the free veinlets that end in hydathodes as well as the sori continuously distributed along veins. Drawn from the holotype, *Y.-s. Chen, Z.-h. Wu, B. Li & X.-s. Guo 1965* (WUK).

status is evaluated as Critically Endangered (CR), based on current information and according to IUCN criteria (IUCN, 2008). We believe there is an urgent need to protect this species.

Taxonomic relationship. *Coniogramme bashanensis* belongs to *Coniogramme* on the basis of the fairly large fronds that are bipinnate, the broadly ovate lamina, with the pinnules serrulate, the pinnule



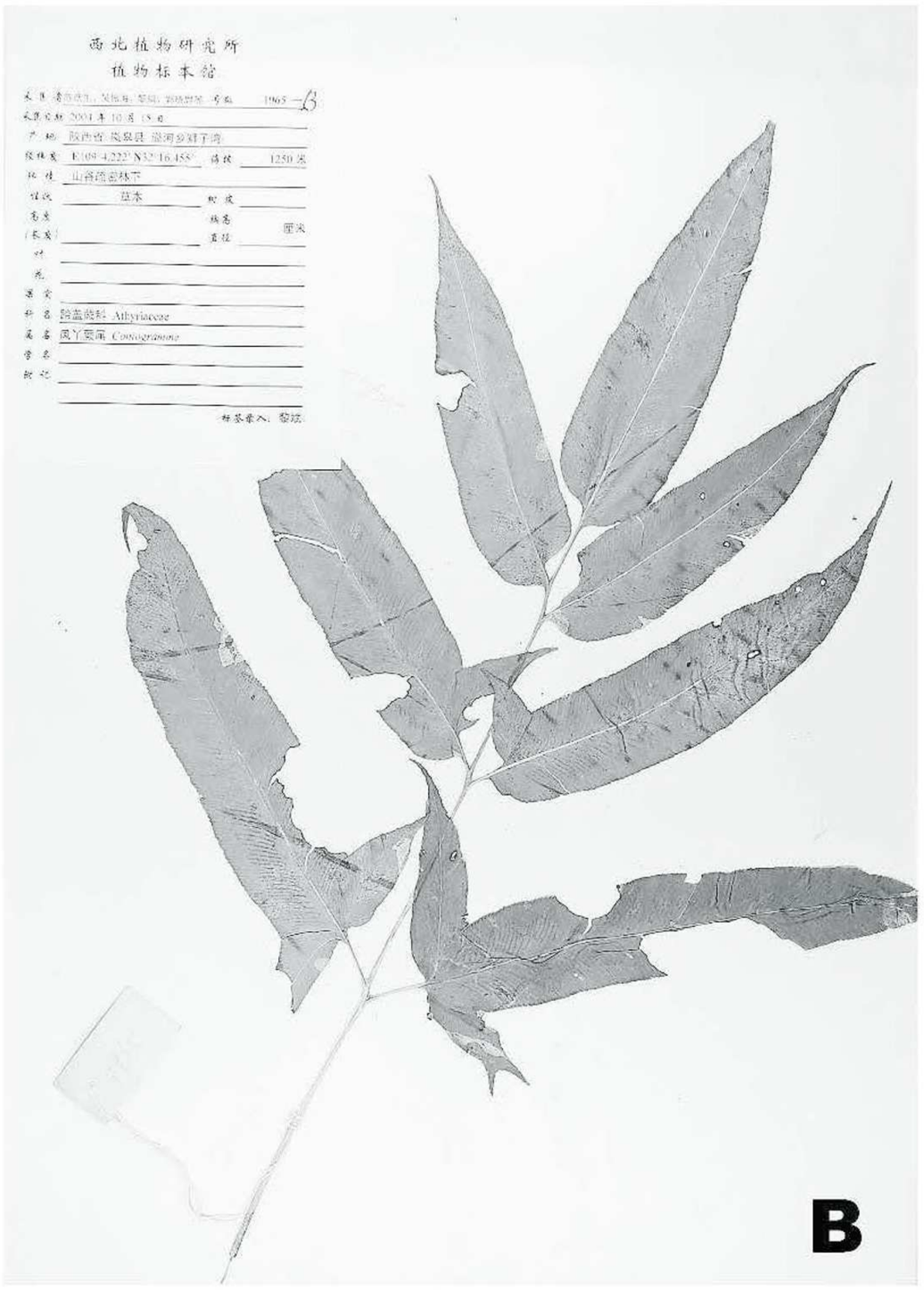


Figure 2. *Coniogramme bashanensis* X. S. Guo & B. Li. —A. Holotype sheet with frond and rhizome. —B. Isotype sheet with frond. —C. Close-up of lower portion of isotype. —D. Portion of isotype magnified to show the free veins ending in hydathodes, with the sori continuous along veins. Photographs taken from the type, *Y.-s. Chen, Z.-h. Wu, B. Li & X.-s. Guo 1965* (WUK).

veins that are free or forked once or twice, or rarely anastomosing without any included, free veinlets. The veinlets end in hydathodes and are attached at sori that are continuously distributed along the veins. *Coniogramme bashanensis* is very distinct from other known species of *Coniogramme* in China and can easily be recognized by having four to five pairs of lateral pinnae. *Coniogramme bashanensis* is otherwise similar to *C. wilsonii* in general morphology. Both species have 1- or 2-forked veins, forming a few discontinuous areoles along each side of costae. The new species differs from the latter by its pinnules oblong to lanceolate, the base unequal, rounded to cuneate, hastate or divided with a small auricular segment, and sparsely short hairs on both lamina surfaces. As for *C. wilsonii*, its pinnules are lanceolate, also with an unequal base, somewhat cordate or rounded to cuneate, and both lamina surfaces are glabrous. *Coniogramme intermedia* was also found near the distributional area of *C. bashanensis*, but the latter species has pinnules with a rounded to cuneate base and veins that do not form

Figure 3. *Coniogramme bashanensis* X. S. Guo & B. Li. —A. Plant habit. —B. An intact plant viewed from above. —C, D. Close-up portions of the plant. Photographed at the type locality by X. S. Guo, with this plant then collected as the paratype, *X.-s. Guo & J.-z. Sun 2012-2* (MO, WUK).

discontinuous areoles along each side of the costae. *Coniogramme* has its greatest diversity in China, Japan, Korea, extending into the Himalayas, Southeast Asia, Africa, and North America (Wu & Ching, 1991).

Paratype. CHINA. **Shaanxi:** Langao, Yihe town, Shiziwan village, 1250–1270 m, 11 Aug. 2012, *X.-s. Guo & J.-z. Sun 2012-2* (MO, WUK).

Acknowledgments. This study was supported by funds from the National Natural Science Foundation of China (grant nos. 30370117, 39899400, 30499340), a special support grant from the Chinese Academy of Sciences for *Flora of China* (KSXX-SW-122), and the Key Program of National Basic Science and Technology Special Fund of China (2007FY110800). Victoria Hollowell, Li-Bing Zhang,

and three anonymous reviewers provided helpful comments.

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